PATENT
Atty. Dkt. No 130394UL (12553-1011)

VIA FACSIMILE TRANSMISSION 1-571-273-8300



## REMARKS

Claims 1-55 were originally presented in the present application, from which claims 48 and 49 have been cancelled without prejudice or disclaimer of the subject matter therein. It is respectfully submitted that the pending claims define allowable subject matter.

With respect to the rejections of claims 1-20 and 30-38 under 35 USC § 101, the undersigned respectfully disagrees. It is believed that the original claims did properly recite patentable subject matter and did define apparatus and methods that produced a useful, concrete and tangible result. Nonetheless, to facilitate examination, the independent claims 1, 12 and 30 have been amended to recite more positively a tangible result, namely to be used in connection with control of display of ultrasound images. Thus, it is submitted that the claims 1-20 and 30-38 define statutory subject matter.

Applicants respectfully traverse the obviousness type double patenting rejection based on USP 6,652,462. It is submitted that the pending claims recite a patentable and distinct invention over the claims of the '462 patent. Claims 10 and 20 of the '462 patent depend from claims 8 and 18, respectively, which depend from dependent claims 7 and 17, respectively, which depend from independent claims 1 and 11. When the limitations of claims 10 and 20 are fully considered, it is clear that fundamentally different inventions are claimed in the '462 patent and in the present application. By way of example, claim 1 of the '462 patent recites an user interface, a front end, and a display. The display displays an image with color hues corresponding to a plurality of ranges of values. The display also displays a color legend, among other things. Method claim 11 of the '462 patent recites similar limitations in method format. The above limitations of claims 1 and 11, and thus claims 10 and 20, are nowhere in the claims of the present application. The additional limitations added in claims 10 and 20 of the '462 patent also differ from the limitations of the independent claims of the present application. For example, the '462 patent claims entirely lack a "trigger extraction program" (claim 1), and lack the "machine readable medium" of claim 12, and lack the "trigger extraction program" of claim 21. Claims 30 and 39 also recite assessing, analyzing and storing steps that are not recited in the

claims of the '462 patent. Thus, it is believed that the obviousness type double patenting rejection is improper and should be withdrawn.

Turning to the prior art rejections, claims 1-55 have been rejected under 35 USC 102(b) or 35 USC 103 based on various combinations of the Brekke article, and the patents to Omiya, Jackson, Linuma, Yamazaki and Moehring, and Resnick. Applicants respectfully traverse these rejections for reasons set forth hereafter.

The claims recite systems, methods and machine readable medium for accessing trigger data from a region of interest, analyzing the trigger data for a trigger characteristic and storing an event trigger based on the trigger characteristic. Each of the independent claims further define the trigger data as being recorded with an ultrasound beam defocused in an azimuth direction.

It is respectfully submitted that the prior art fails to teach or suggest any such structure or methods. The Brekke article describes a dynamic 3D ultrasound imaging technique that utilizes a trigger signal. The trigger signal described in the Brekke article is described as follows:

> "To obtain this [trigger signal], we record invisible 2D Tissue Doppler Data along the B-Mode frames. This data stream intercepts the radial component of motion in a slice surrounding the B-Mode scan plane. Since we use a 1.5D probe, this elevational side of the slice can be enlarged by defocusing the beams in elevation direction." [see the Method section of the IEEE Brekke article].

Nowhere does the Brekke article teach or suggest any reason or advantage to defocus the ultrasound beam in the azimuth direction. As explained the present application, defocusing in the azimuth direction reduces the number of beams needed to cover a given area. The prior art fails to teach defocusing in the azimuth direction and fails to suggest any reason to do so.

Omiya lacks any suggest to defocus, either in the azimuth or elevation directions. Omiya describes a characteristic value extraction unit 104 that extracts and calculates characteristic values from the region of interest. It is significant to note that a fundamental aspect of the characteristic value extraction technique of Omiya is to identify the characteristic by calculating a volume or a radius of the region of interest. The volume or radius is calculated from the ultrasound image acquired by the system. Thus, Omiya's system calculates the characteristic value from the images that are acquired for display. Omiya's system does not obtain trigger data, that is separate and distinct, from the image data. Instead, Omiya utilizes the image data

that defines the ultrasound image to calculate a volume or a radius of a region of interest based on the ultrasound images themselves. Thus, Omiya fails to teach or suggest the claimed analyzing and accessing operations. In addition, Omiya fails to provide any reason for defocusing the ultrasound beam in the azimuth direction. In fact, Omiya's system teaches away from defocusing the ultrasound beam since doing so would reduce the resolution of Omiya's ultrasound image. Thus, it is believed that neither Brekke nor Omiya teach or suggest the claimed invention.

The remaining secondary references fail to make up for the deficiencies of Omiya and Brekke. The remaining references do not concern trigger extraction systems and therefore do not, among other things, access trigger data obtained from a trigger region, nor analyze trigger data for a trigger characteristic. Jackson utilizes an ECG monitor to obtain an ECG input. Linuma concerns an ultrasound system that tracks changes in velocity of portions of the ultrasound image. Neither Jackson, Linuma, Yamazaki, Moehring nor Resnick discuss defocusing of the ultrasound beam, for any reason, let alone in connection with obtaining trigger data from a trigger region, where the trigger data is subsequently analyzed for a trigger characteristic. Thus, the presently pending claims are believed to be patentably distinct over the prior art.

In addition, it is submitted that the dependent claims recite additional patentably distinct features. Several of the dependent claims recite the use of filtering generally or high pass filtering in particular (claims 3, 5, 9, 14, 18, 31, 33, 36 and 53). In the Outstanding Office Action it is maintained that it would have been obvious to utilize high pass filtering. The undersigned disagrees. The claimed filtering and high pass filtering limitations are to filter trigger data by the trigger extraction program. In the prior art, the use of filters and high pass filters was in connection with imaging data for ultrasound images. The filtering characteristics associated with obtaining image data do not necessarily correspond to the filter parameters to be used in connection with obtaining trigger data. Therefore, simply because the prior art utilizes filters in connection with imaging data, it does not necessarily follow that it would have been obvious to the person of ordinary skill to use a filter, let alone a high pass filter, in connection with trigger data.

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In addition, claim 3 recites the limitation that the high pass filter is based on the trigger characteristic. Nowhere in the prior art is a high pass filter discussed that is based on a trigger characteristic. Claim 9 further defines the analysis to include filtering of the trigger data utilizing a cutoff frequency that is set based on the trigger characteristic and independent of the image data. Nowhere does the prior art describe utilizing a filter having a cutoff frequency that is set based on a trigger characteristic.

Further, claims 4 and 30 define the trigger data to be formed using averaging over at least a portion of depth range. Nowhere in the prior art is averaging of trigger data over the depth range taught or suggested. Neither Brekke nor Omiya describe averaging in the depth range. The remaining references do not discuss trigger data. In fact, Omiya would not average over the depth range as this would reduce the resolution of the image data.

In view of the foregoing comments, it is respectfully submitted that the pending claims define allowable subject matter. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,

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